

IN THE CLAIMS:

- 1 1. (Currently Amended) A system for indexing and manipulating a set of backup data
2 stored on a destination system interconnected with a plurality of source file-system servers
3 having source data from which the backup data is transmitted to the destination system
4 comprising:
5 the plurality of source servers connected together to transmit the backup data to
6 the destination storage system;
7 a management application executed by a ~~computer~~processor, where the manage-
8 ment application (a) communicates with the destination storage system and that accesses
9 data identifiers related to the backup data organized in a tree structure and representing a
10 plurality of persistent consistency point images (PCPIs) of the data, each with associated
11 information related to creation time, (b) scans the plurality of PCPIs stored on the desti-
12 nation storage system to generate an index of directories, files, or qtrees, where each di-
13 rectory, file, or qtree has one or more versions created at one or more different points in
14 time, and (c) organizes the data identifiers into a structure that enables the data to be dis-
15 played according to directory, file or qtree; and
16 a user interface to select a directory, file, or qtree to view and to select a source
17 server from the plurality of source serves storing the selected directory, file or qtree,
18 where the management application returns a list of only the selected directory, file, or
19 qtree and the one or more versions of the selected directory, file, or qtree, wherein each
20 version of the selected directory, file, or qtree is stored in a separate PCPI and at least one
21 version of the selected directory, file or qtree is stored on a second source server.
- 1 2. (Original) The system as set forth in claim 1 further comprising a database that stores
2 the data identifiers and rules for handling the data identifiers for retrieval by the user in-
3 terface and the management application.

1 3. (Currently Amended) The system as set forth in claim 2 further comprising, in the des-
2 | tination storage system, a network data management protocol (NDMP) extension, com-
3 | municating with a storage operating system of the destination storage system and provid-
4 | ing NDMP-based communication between the management application and the storage
5 | operating system.

1 4. (Original) The system as set forth in claim 3 further comprising a job framework that
2 | organizes a plurality of backup operations and restore operations by the management ap-
3 | plication and that communicates with the user interface so as to enable a user to access
4 | information with respect to status of the backup operations and restore operations organ-
5 | ized by the job framework.

1 5. (Currently Amended) The system as set forth in claim 4 further comprising a scheduler
2 | that interfaces with the source system and that performs the backup operations, transmit-
3 | ting the backup data from the source system to the destination storage system at a prede-
4 | termined time interval.

1 6. (Original) The system as set forth in claim 5 wherein the user interface includes a
2 | screen that enables a user to set a desired lag time after which failure to complete a
3 | scheduled backup operation caused an event to occur.

1 7. (Currently Amended) The system as set forth in claim 1 further comprising the user
2 | can select (a) a listing of source data entries indexed by names of the source system and
3 | (b) a listing of source data entries indexed by names of volumes of the destination storage
4 | system in which the backup data from the source data resides.

1 8. (Currently Amended) The system as set forth in claim 7 wherein each of the entries of
2 | each listing includes a browse backups button that enables a user to view backup data

3 | stored on the destination storage system that is associated respectively with each of the
4 | entries.

1 | 9. – 11. (Cancelled)

1 | 12. (Previously Presented) The system as set forth in claim 8 wherein each of the entries
2 | of each listing includes a restore button that enables a user to view restorable backup data
3 | structures with respect to each of the entries and to restore the backup data structures to
4 | the source data.

1 | 13. (Cancelled)

1 | 14. (Previously Presented) The system as set forth in claim 12 wherein each qtree in-
2 | cludes qtree relationships with respect to other qtrees within the source system.

1 | 15. (Currently Amended) The system as set forth in claim 14 wherein the user interface
2 | includes a command for destroying a qtree relationship between the source data and a se-
3 | lected volume of the backup data in the destination storage system.

1 | 16. (Currently Amended) The system as set forth in claim 15 wherein the management
2 | application is adapted to delete a respective qtree associated with the qtree relationship on
3 | the destination storage system in response to activation of the command for destroying.

1 | 17. (Currently Amended) The system as set forth in claim 1 further comprising, in the
2 | user interface, a screen that enables selected of the source data to be listed as entries and
3 | to be transmitted as backup data to the destination storage system at a time separate from
4 | a scheduled backup time.

1 18. (Currently Amended) A method for indexing and manipulating a set of backup data
2 stored on a destination system interconnected with a plurality of source file-system servers
3 having source data from which the backup data is transmitted to the destination system
4 comprising:

5 communicating, by a management client, with the destination system and access-
6 ing data identifiers related to the backup data organized in a tree structure and represent-
7 ing a plurality of persistent consistency point images (PCPIs) of the data, each with asso-
8 ciated information related to creation time;

9 scanning the plurality of PCPIs stored on the destination system to generate an
10 index of directories, files, or qtrees, where each directory, file, or qtree has one or more
11 versions created at one or more different points in time;

12 organizing the data identifiers into a structure that enables the data to be dis-
13 played according to directory, file, or directory; and

14 selecting, on a user interface, a directory, file, or qtree to view and selecting a
15 source server from the plurality of source serves storing the selected directory, file or
16 qtree, where the management application returns a list of only the selected directory, file,
17 or qtree and the one or more versions of the selected directory, file, or qtree, wherein
18 each version of the selected directory, file, or qtree is stored in a separate PCPI.

1 19. (Original) The method as set forth in claim 18 further comprising storing, in a data-
2 base, the data identifiers and rules for handling the data identifiers for retrieval by the
3 user interface and the management application.

1 20. (Previously Presented) The method as set forth in claim 19 further comprising provid-
2 ing, in the destination system, a network data management protocol (NDMP) extension,
3 communicating with a storage operating system of the destination system and providing
4 NDMP-based communication between the management application and the storage oper-
5 ating system.

1 21. (Original) The method as set forth in claim 20 further comprising organizing, in a job
2 framework, a plurality of backup operations and restore operations by the management
3 application and that communicates with the user interface so as to enable a user to access
4 information with respect to status of the backup operations and restore operations organ-
5 ized by the job framework.

1 22. (Original) The method as set forth in claim 21 further comprising interfacing a sched-
2 uler with the source system and performing, at scheduled times, backup operations that
3 transmit the backup data from the source system to the destination system at a predeter-
4 mined time interval.

1 23. (Original) The method as set forth in claim 22 wherein the user interface includes a
2 screen that enables a user to set a desired lag time after which failure to complete a
3 scheduled backup operation caused an event to occur.

1 24. (Previously Presented) The method as set forth in claim 18 further comprising select-
2 ing (a) a listing of source data entries indexed by names of the source system and (b) a
3 listing of source data entries indexed by names of volumes of the destination system in
4 which the backup data from the source data resides.

1 25. (Original) The method as set forth in claim 24 wherein each of the entries of each list-
2 ing includes a browse backups button that enables a user to view backup data stored on
3 the destination system that is associated respectively with each of the entries.

1 26. – 28. (Cancelled)

1 29. (Previously Presented) The method as set forth in claim 24 wherein each of the en-
2 tries of each listing includes a restore button that enables a user to view restorable backup

3 data structures with respect to each of the entries and to restore the backup data structures
4 to the source data.

1 30. (Cancelled)

1 31. (Previously Presented) The method as set forth in claim 29 wherein each qtree in-
2 cludes qtree relationships with respect to other qtrees within the source system.

1 32. (Original) The method as set forth in claim 31 wherein further comprising providing,
2 in the user interface, a command for destroying a qtree relationship between the source
3 data and a selected volume of the backup data in the destination system.

1 33. (Previously Presented) The method as set forth in claim 32 further comprising, in re-
2 sponse to activation of the command for destroying, deleting a respective qtree associated
3 with the qtree relationship on the destination system in response to activation of the
4 command for destroying.

1 34. (Original) The method as set forth in claim 18 further comprising providing, in the
2 user interface, a screen that enables selected of the source data to be listed as entries and
3 to be transmitted as backup data to the destination system at a time separate from a
4 scheduled backup time.

1 35. (Currently Amended) A method for managing backup of data from a source ~~system~~
2 server to a destination system and restore of backup data, relative to source data, from the
3 source system to the destination system comprising:
4 communicating, by a management application, with each of the source ~~system~~
5 server and the destination system and transmitting requests to read a data organization
6 residing on each of the source ~~system~~ server and the destination system to derive an index

7 | of directories, files, or qtrees for each of the source ~~system-server~~ and the destination sys-
8 tem;

9 scanning a plurality of persistent consistency point images (PCPIs) stored on the
10 destination system to generate the index of directories, files, or qtrees, where each direc-
11 tory, file, or qtree has one or more versions created at one or more different points in
12 time;

13 selecting a directory, file, or qtree to view; and

14 displaying, with a user interface communicating with the management applica-
15 tion, only the selected directory, file, or qtree related to active data on the source ~~system~~
16 server derived from source ~~system-server~~ index related to active data and the selected di-
17 rectory, file, or qtree related to backup data on the destination system derived from desti-
18 nation system index related to PCPIs transmitted from the source data during backup op-
19 erations, wherein each version of the selected directory, file, or qtree is stored in a sepa-
20 rate PCPI.

1 36. (Cancelled)

1 37. (Previously Presented) The method as set forth in claim 35 wherein the steps of com-
2 municating and transmitting include formatting information into a network data manage-
3 ment protocol (NDMP).

1 38. (Previously Presented) The method as set forth in claim 35 further comprising activat-
2 ing user interface buttons associated with entries of the displayed selected information to
3 conduct either of a backup operation and a restore operation with respect to the entries.

1 39. (Currently Amended) A system, comprising:

2 a processor;

3 a computer-readable medium including program instructions executed on the
4 | processor to manage backup of data from a plurality of source ~~system-servers~~ to a desti-

5 nation system and restore of backup data, relative to source data, from ~~the each~~ source
6 ~~system server~~ to the destination system, the program instructions performing the steps of:
7 communicating, by a management application, with each of the source ~~system~~
8 servers and the destination system and transmitting requests to read a data organization
9 residing on each of the source ~~system servers~~ and the destination system to derive an in-
10 dex of directories, files, or qtrees for each of the source ~~system servers~~ and the destina-
11 tion system;

12 scanning a plurality of persistent consistency point images (PCPIs) stored on the
13 destination system to generate the index of directories, files, or qtrees, where each direc-
14 tory, file, or qtree has one or more versions created at one or more different points in
15 time;

16 selecting a directory, file, or qtree to view and a source server from the plurality
17 of source serves storing the selected directory, file or qtree; and

18 displaying, with a user interface communicating with the management applica-
19 tion, only the selected directory, file, or qtree related to active data on the source system
20 derived from source system index related to active data and the selected directory, file, or
21 qtree related to backup data on the destination system derived from destination system
22 index related to PCPIs transmitted from the source data during backup operations,
23 wherein each version of the selected directory, file, or qtree is stored in a separate PCPI.

1 40. (Cancelled)

1 41. (Original) The computer-readable medium as set forth in claim 39 wherein the steps
2 of communicating and transmitting include formatting information into a network data
3 management protocol (NDMP).

1 42. (Currently Amended) A system, comprising:

2 | a source storage system ~~that generates~~ configured to generate a plurality of persis-
3 tent consistency point images (PCPIs), and transfers the plurality of PCPIs and data to a
4 destination storage system;

5 the destination storage system executes a management client, where the manage-
6 ment client organizes the plurality of PCPIs and the data into an index using a database to
7 allow the plurality of PCPIs and the data to be displayed in (a) a listing of source data en-
8 tries indexed by names of directories, file or qtrees of the source storage system, where
9 each directory, file, or qtree has one or more versions created at one or more different
10 points in time (b) a listing of source data entries indexed by names of the source storage
11 system, and (c) a listing of source data entries indexed by names of volumes of the desti-
12 nation storage system in which the backup data from the source data resides; and

13 an interface to select a data entry for a directory, file, or qtree, and the manage-
14 ment client returns a list of only the selected directory, file, or qtree and the one or more
15 versions of the selected directory, file, or qtree, wherein each version of the selected di-
16 rectory, file, or qtree is stored in a separate PCPI.

1 43. – 45. (Cancelled)

1 46. (Previously Presented) The system of claim 42, wherein the database stores the plu-
2 rality of PCPIs and rules for handling the plurality of PCPIs for retrieval by the interface
3 and the management client.

1 47. (Previously Presented) The system of claim 42, wherein the source storage system
2 upon initialization sends a base PCPI and data to the destination storage system.

1 48. (Previously Presented) The system of claim 42, further comprising a scheduler that
2 interfaces with the source storage system and performs backup operations of transmitting
3 backup data including one or more PCPIs and change data from the source storage sys-
4 tem to the destination storage system at a predetermined time interval.

1 49. (Currently Amended) A method, comprising:
2 | transferring a plurality of persistent consistency point images (PCPIs) from a plu-
3 | rality of source storage system servers to a destination storage system;
4 | scanning the plurality of PCPIs to create an index of data structures in a database
5 | on the destination system, wherein each data structure is a file, directory, or qtree and
6 | each data structure has one or more versions created at one or more different points in
7 | time and one or more versions stored on separate source servers ;
8 | selecting a data structure to view;
9 | returning an entry for the selected data structure and entries for the one or more
10 | versions of the selected data structure to allow a user to select a particular entry to re-
11 | store, wherein each version of the selected data structure is stored in a separate PCPI.

1 50. (Currently Amended) A method, comprising:
2 | transferring a plurality of persistent consistency point images (PCPIs) from a
3 | source storage system to a destination storage system;
4 | scanning the plurality of PCPIs to create an index of a file in a database on the
5 | destination system, wherein the file has a plurality of versions with each version of the
6 | file stored in a separate PCPI;
7 | | selecting the file to view and a source storage system from a plurality of source
8 | storage systems storing the selected file; and
9 | displaying the selected file and the plurality versions of the file to allow a user to
10 | select a particular file to restore from the selected file and the plurality versions of the
11 | file.